

2015 Monitoring Summary



Scarham Creek at Dekalb County Road 28 (34.30261/-86.02032)

BACKGROUND

A 12.0 mile segment of Scarham Creek from Short Creek to its source was placed on Alabama's 1996 Clean Water Act §303(d) list of impaired waters for not meeting its *Fish & Wildlife (F&W)* water use classification criteria. The segment was added to the list based on results of fish community assessments conducted in 1994 and 1996 by the Tennessee Valley Authority (TVA). Both surveys rated the stream as "poor". The segment was listed for impairment caused by ammonia, nutrients, organic enrichment/dissolved oxygen, pathogens, pesticides, and siltation. The sources of these impairments were listed as non-irrigated crop production, specialty crop production, feed lots, and animal holding/management areas. In 1998, the segment was delisted for nutrients, and pasture grazing was included as an additional source of the remaining impairments.

In 2002, the Alabama Department of Environmental Management (ADEM) developed three Total Maximum Daily Loads (TMDLs) to address impairments from low dissolved oxygen/organic loading and nitrogen as ammonia, pesticides, and pathogens. In 2003, the ADEM developed a TMDL to decrease the sediment load of 22 stream segments within the Lower Tennessee River Basin, including Scarham Creek.

The Upper Scarham Creek Watershed was selected as a priority by ADEM for the development of a Watershed Management Plan (WMP) in 2014. The *Top of Alabama Regional Council of Governments* completed the Upper Scarham Creek WMP in June 2015. In August 2015, the DeKalb County Soil and Water Conservation District (SWCD) received a subaward from ADEM to implement the Upper Scarham Creek Watershed Project using FY2014 Section 319 funding. The WMP was implemented by leveraging funding provided by the NRCS, ADEM Section 319 Program, and other partners, August 2015-February 2018. A summary of the total best management practices (BMPs) implemented during the project are listed in Table 1.

In 2015, the ADEM monitored Scarham Creek at SHMD-2 using FY2014 Section 319 funding to document conditions within the stream prior to the implementation of these BMPs.



Figure 1. Scarham Creek at SHMD-2, August 12, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 2. Located within Gunterville Lake Sub-basin, Scarham Creek at SHMD-2 lies within the Southern Table Plateaus (68d) ecoregion. According to the 2011 National Land Cover Dataset, land-use within the watershed is primarily agricultural (58%). The main crops within the watershed are soybean and corn (ADEM 2002). As of April 1, 2016, there are three active NPDES outfalls that discharge to Scarham Creek.

Table 1. Summary of best management practices implemented in the Upper Scarham Creek Watershed, August 2015-February 2018.

Best Management Practices	Quantity
Alternative Water Sources	7 units
Fence	9,531 ft
Forage & Biomass Planting	84.2 ac
Heavy Use Area Protection	23,987 ft ²
Livestock Pipeline	3,488 ft
Livestock Use Area Protection	21,530 ft ²
Pasture & Hayland Management	72 ac
Pumping Plant	1
Waste Storage Facility	6,400 ft ²
Water Well	1

Table 2. Summary of watershed characteristics.

Watershed Characteristics		Tennessee R
Basin		
Drainage Area (mi²)		30
Ecoregion^a		68D
% Landuse^b		
Open water		<1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	14%
	Evergreen	4%
	Mixed	12%
Shrub/scrub		3%
Grassland/herbaceous		1%
Pasture/hay		48%
Cultivated crops		10%
Development	Open space	5%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		31
# NPDES Permits^d	TOTAL	3
	Industrial General	1
	Industrial Individual	1
	UIC Sites	1

a. Southern Table Plateaus

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

REACH CHARACTERISTICS

General observations (Table 3) and a habitat assessment (Table 4) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Overall habitat quality was rated as *sub-optimal*. However, sand and silt comprised 68% of bottom substrates within the reach.

Table 3. Physical characteristics of Scarham Creek at SHMD-2, May 28, 2015.

Physical Characteristics		
Width (ft)		20
Canopy Cover		Estimate 50/50
Depth (ft)	Riffle	0.8
	Run	2.5
	Pool	2.5
% of Reach	Riffle	5
	Run	80
	Pool	15
% Substrate	Bedrock	2
	Boulder	10
	Cobble	10
	Gravel	2
	Sand	50
	Silt	18
	Organic Matter	8

Table 4. Results of the habitat assessment conducted on Scarham Creek at SHMD-2, May 28, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	65	Sub-Optimal (55-79)
Sediment Deposition	64	Sub-Optimal (55-79)
Riffle frequency	52	Marginal (31-<55)
Bank Vegetative Stability	73	Sub-Optimal (58-79)
Riparian Buffer	80	Sub-Optimal (60-84)
Habitat Assessment Score	136	
% of Maximum Score	72	Sub-Optimal (57-80)

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Survey method (WMB-I). The WMB-I measures taxonomic richness and community composition and tolerance to assess the overall health of the community. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Scarham Creek at SHMD-2 scored 40 out of 100 total points, indicating the community to be in *fair* (39-58) condition (Table 5).

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 6. In situ measurements and water samples were collected monthly from March through October 2015. Dissolved oxygen was <5.0 mg/L, the criterion for *F&W* streams, during the low flows experienced on August 6, 2015. Median specific conductance and alkalinity were higher than background concentrations, based on ecoregional reference reach data collected in the ecoregion 68d. The ammonia concentration was also higher than expected for streams in this area on August 12th.

The geometric mean of *e. coli* samples collected in June (58.3 cfu/100 mL) and August (61.2 cfu/100 mL) did not exceed the summer (126 cfu/100 mL) or winter (548 cfu/100 mL) *e. coli* criteria for *F&W* streams. However, samples collected on June 1, August 19, and October 29 exceeded the single sample summer criterion. Stream flows were 24.7 cfs, 6.1 cfs, and 12.0 cfs on these dates, respectively.

Table 5. Results of the macroinvertebrate bioassessment conducted in Scarham Creek at SHMD-2, May 28, 2015.

Macroinvertebrate Assessment			
	Results	Scores	
		(0-100)	
Taxa richness measures			
	# EPT taxa	19	65
Taxonomic composition measures			
	% Non-insect taxa	10	64
	% Dominant taxon	26	58
	% EPC	6	7
Functional feeding group measures			
	% Predators	4	10
Tolerance measures			
	% Taxa as Tolerant	35	39
	WMB-I Assessment Score	---	40
	WMB-I Assessment Rating		Fair (39-58)

SUMMARY

Biological survey results indicated the macroinvertebrate community in Scarham Creek at SHMD-2 to be in *fair* condition, and overall habitat quality to be *sub-optimal*. However, the reach was characterized by a high percentage of sand and silt for a stream in ecoregion 68d.

Water quality sampling indicated specific conductance, alkalinity, and ammonia to be higher than background levels for this ecoregion. Dissolved oxygen was <5.0 mg/L, the criterion for *F&W* streams, during the low flows experienced on August 6, 2015. *E. coli* exceeded the single sample summer criterion on June 1, August 19, and October 29.

Table 6. Water quality data collected monthly March – October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median and average (Avg) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	Exc
Physical						
Temperature (°C)	16	12.4	25.4	22.2	20.7	
Turbidity (NTU)	19	1.0	13.8	1.8	2.9	
Total Dissolved Solids (mg/L)	8	47.0	71.0	59.5	58.6	
Total Suspended Solids (mg/L)	8	< 1.0	3.0	1.0	1.1	
Specific Conductance (µmhos/cm)	16	72.0	121.0	83.0 ^G	89.9	
Alkalinity (mg/L)	8	2.9	45.5	22.0 ^M	21.5	
Monthly Stream Flow (cfs)	18	0.1	62.8	1.1	10.5	
Measured Stream Flow (cfs)	15	0.5	62.8	5.3	12.6	
Chemical						
Dissolved Oxygen (mg/L)	16	4.1 ^C	10.5	7.5	7.5	1
pH (SU)	16	6.5	7.7	7.2	7.1	
Ammonia Nitrogen (mg/L)	8	< 0.007	0.149	0.004	0.033	1
Nitrate+Nitrite Nitrogen (mg/L)	8	0.200	1.880	0.554	0.841	
Total Kjeldahl Nitrogen (mg/L)	8	0.368	0.700	0.508	0.535	
Total Nitrogen (mg/L)	8	0.704	2.393	1.136	1.376	
Dis Reactive Phosphorus (mg/L)	8	< 0.005	0.057	0.010	0.015	
Total Phosphorus (mg/L)	8	0.020	0.069	0.035	0.038	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	
Chlorides (mg/L)	8	3.7	6.4	4.5	4.6	
Atrazine (µg/L)	3	< 0.10	0.16	0.05	0.08	
Sulfate (mg/L)	5	1.92	10.20	3.73	5.88	
Biological						
Chlorophyll a (mg/m ³)	8	< 1.00	1.00	0.50	0.50	
<i>E. coli</i> (MPN/DL)	15	5.2	2481.0 ^C	57.6	277.0	3

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68d; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68d; N=# samples.